Editorials

A Dangerous Waste of Time: Teaching Every Soldier Intravenous Line Placement

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The time has come to remove intravenous catheterization training from the Army's Combat Life Saver (CLS) Course. Obtaining intravenous (IV) access and initiating IV fluid resuscitation does not save lives on the battlefield. Returning effective fire, aggressive hemorrhage control with correct tourniquet and hemostatic dressing application, needle decompression of tension pneumothorax, and airway management are the Tactical Combat Casualty Care (TC3) skills that do save lives. The recent mandate by the U.S. Army Training and Doctrine Command (TRADOC) requiring all Soldiers entering Basic Combat Training (BCT) after October 1st 2007 to be CLS certified is an outstanding step to improve training across the Army in lifesaving first-aid skills.[1] However, requiring all Soldiers to be competent in placing an intravenous line and initiating treatment with IV fluids, per the current CLS standards, may not be the best use of precious training resources in the light of the most recent medical research and battlefield experience. In fact, it may result in additional injury or death to both injured Soldiers and their comrades providing aid.

The outcome of a battle casualty will often be determined by whoever provides initial care. In most cases this will be a fellow Soldier, not the Medic. The CLS course was developed to bridge the gap between self-aid or buddy aid until care could provided by the platoon 68W Combat Medic.[2] The CLS concept has been further refined over the last decade to reflect the concepts of TC3. Tactical Combat Casualty Care focuses on treating the leading causes of preventable battlefield death while minimizing the risk to first-aid providers and the tactical mission.[3] The TC3 concept is possibly the most significant advance in point of injury care since the distribution of the individual field dressing in the late 1800s.[4]

The most important battlefield first-aid skill is controlling hemorrhage, by far the leading and most preventable cause of battlefield death in modern warfare. Bellamy showed 7% of those killed in action during the Vietnam Conflict died of potentially preventable extremity hemorrhage.[5] A similar fatality rate from compressible extremity hemorrhage in Iraq was demonstrated by Cuadrado et al.[6]

Proper tourniquet application is the most important method in controlling severe hemorrhage in the tactical setting. Current military doctrine mandates use of a tourniquet as a first-line treatment for casualties who have extremity hemorrhage when care is administered under hostile fire.[7] Yet Soldiers' lives were lost in the early phases of the conflicts in Iraq and Afghanistan because a tourniquet was not applied.[8,9] The Army now issues individual commercially fabricated tourniquets to each Soldier deploying to a combat zone. More than 400,000 tourniquets had been issued.[10]

Other lifesaving skills emphasized in the TC3 include needle decompression of a tension pneumothorax and airway management, the second and third leading causes of preventable battle field deaths, causing 4% and 1% of all fatal injures respectively.[5,11]

The main purpose of performing IV catheterization in the setting of trauma is to administer fluids or blood products to treat hemorrhagic shock. Seven percent of traumatically injured patients on the battlefield require aggressive resuscitation.[12] Current transfusion protocols emphasize fresh whole blood and pro-coagulants rather than crystalloids to restore organ perfusion, prevent the dilution of clotting factors, and avoid hypothermia.[12] For patients in significant hemorrhagic shock, aggressive hemorrhage control at the point of wounding, followed by expeditious transport to surgical care is most important. Evacuation and subsequent surgical management of non-compressible truncal hemorrhage should not be delayed by attempts to place an IV.

In the management of shock, the traditional strategy of early fluid resuscitation beginning in the field and continuing into the operating room has been challenged, specifically in the context of penetrating thoracic trauma. In 1994, a prospective trial by Bickell et al., compared immediate versus delayed fluid resuscitation in hypotensive patients with penetrating torso injuries. They reported that patients in whom fluids were restricted until arrival in the operating room had lower mortality, fewer postoperative complications, and shorter hospital length of stay.[13] In a follow-up prospective trial, patients were divided into either restrictive resuscitation (goal systolic blood pressure (SBP) greater than 80 mm Hg) versus liberal resuscitation (goal SBP greater than 100 mm Hg). There was not a significant difference in mortality between groups but hemorrhage did take

longer to control in the group with the liberal fluid strategy.[14]

These studies were largely responsible for significant changes in the management of injured Soldiers on the battlefield and were adopted by American Military and Israeli Defense Forces.[15-19] In 2003, the term "hypotensive resuscitation" was introduced in a paper entitled, "Fluid Resuscitation in Modern Combat Casualty Care: Lessons Learned from Somalia."[15] Current military pre-hospital doctrine now emphasizes restricting IV fluids in casualties who have controlled hemorrhage, normal mental status, and stable vital signs or even mild hypotension (systolic blood pressure greater than 90). A relatively small percentage of all combat casualties are likely to benefit from IV fluid resuscitation on the battlefield. These include patients with significant hypotension resulting from severe hemorrhage **that has been controlled**; and those with hypotension or severe hemorrhage **and** a head injury. All other casualties with uncontrolled hemorrhage and signs of shock may be challenged with a very limited amount of IV fluid (1000 mLs of Hextend); further fluid administration is likely to be detrimental. The practice of permissive hypotension is designed to prevent "popping the clot" off an injured vessel as well as diluting clotting factors with massive amounts of crystalloid fluid.

Proper IV placement is a skill that requires significant time to train. In the current CLS course, the IV portion is the longest, most resource and instructor intensive block of training. This time could be better spent focusing on tactical casualty scenarios and emphasizing other skills that actually save lives. In the civilian sector, basic emergency medical technicians (EMT-B) are not taught IV insertion. The first level of civilian EMT to have IV placement in their scope of practice is EMT-Intermediates. The national standard curriculum for EMT-I requires 300 to 400 hours of classroom and field instruction. EMT-I students are required to place at least 25 IVs on live patients of various age groups under instructor supervision to be considered competent in this skill.[20] The current 2006 CLS Course Instructor Guide (Edition B, Subcourse ISO0873) does not specify the number of successful IV catheterizations required to certify a CLS in this skill. It is left to the unit's medical officer. Certification will not mean CLS trained personnel will be competent in placing IVs. At best it will mean they are familiar with the procedure.

Casualties presenting in overt shock typically have difficult intravenous access. They are often extremely diaphoretic and their peripheral vasculature is constricted. Placement of an IV in a trauma patient in a moving ambulance by an experienced EMT-I or higher level provider takes 10 to 12 minutes and has a 10% to 40% failure rate.[21] Paradoxically, starting an IV in those patients who would most benefit from limited fluid resuscitation will be extremely difficult for even the most skilled medical provider.

In a hostile tactical situation combined with darkness, fatigue, and fear it will be very unlikely that a Soldier without significant medical experience will be able to place an IV under battlefield conditions. For this reason, TC3 guidelines emphasize sternal intraosseous catheter placement for fluid resuscitation.[22]

Insertion of an IV catheter is not without risks. Complications include local and systemic infections, thrombophlebitis, catheter embolism, and injury to associated nerves, tendons and arteries.[23-25] These complications are inversely related to skill and experience of the medical provider. Using non-medical personnel to train basic trainees will likely result in an increased rate of complications and lost duty days as Soldiers practice this skill on one another.

Based on the literature available and the lessons being learned from both Iraq and Afghanistan, it is clear that IV placement is not a critical skill needed at the point of wounding, while hemorrhage control is. Training all Soldiers to start IVs without the requisite understanding of the indications, contraindications, plus the risks and benefits of who would benefit from IV fluids and who could be harmed is a waste of precious training time that will result in many receiving unneeded or detrimental care on the battlefield. If Solders spend the vast majority of their first-aid training time learning IV placement, the most time consuming skill in the CLS course, yet one that does not save lives, which tool will they reach for under the stress of combat? How many Soldiers will be killed by snipers as they waste precious minutes starting IVs? How many casualties will have evacuation delayed while attempts to "get the IV" are made? How many will neglect proper tourniquet and dressing application in lieu of the more "technical" and "high-speed" IV insertion?

While most Soldiers will not benefit from IV training, it may have a place in some units. Units operating far forward with little or no organic medical support such as Special Operations Forces (SOF) may benefit from this training. These units are often small and have the time and resources to train to a high standard in advanced first-aid skills.

The recent mandate by TRADOC to train all Soldiers in IV placement is well-intentioned and shows our battlefield commanders want robust first-aid training for our warriors. It is the duty of the AMEDD and military healthcare providers to advise our combat commanders what constitutes the best practices of battlefield care. Yet, few AMEDD officers have ever cared for a patient under fire or experienced ground combat. Few understand the principles of Tactical Combat Casualty Care. Since the majority of the AMEDD's funding and focus is on hospital based care, we have in the past simply extended civilian trauma care principles to the battlefield. We can do better. Tactical and medical lessons from the present conflict must be synthesized to optimize the care of our Soldiers. This will require military healthcare providers to develop an understanding of combat and the nature of the battlefield in order to advise combat commanders how to balance the mission, training, and resources with optimal medical care during combat.

Many line commanders likely participated in IV train-

ing led by their unit medical officers during their formative years. Insertion of an IV on the "first stick" is probably considered by many of them as the quintessential battlefield medical skill. It is not. Rapid hemorrhage control is. Adding additional medical training for all Soldiers is much needed. TRADOC has taken an excellent first step. It is up to the military medical establishment to educate and advise our line commanders so together we can save lives on the battlefield and accomplish the Army mission.

LIST OF ABBREVIATIONS:
IV – intravenous
TC3 – Tactical Combat Casualty Care
TRADOC – Training and Doctrine Command
SOF – Special Operations Forces
SBP – Systolic Blood Pressure
AMEDD – Army Medical Department
CLS – Combat Life Saver
EMT-I – Emergency Medical Technician - Intermediate
BCT – Basic Combat Training

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